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COMPLETE SPECIFICATION

(54) Light-weight support for electronic components

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PATENT APPLICATION BY: (71)
IMPHY S.A., A FRENCH COMPANY, OF 168, RUE DE RIVOLI, 75001
PARIS, FRANCE.

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The invention relates to a light-weight support for electronic components and, more particularly, for electronic components in a leadless aluminium housing.

5 The growth in number and in complexity of the functions required of electronics used leads to the grouping of an increasing number of electronic components on one and the same support. However, this trend exacerbates problems of size, reliability, heat dissipation and weight.

10 Although the widespread use of leadless housings has contributed to the reduction in size, it has given rise to problems with respect to the support. In fact, this support must have a coefficient of expansion adapted to that of the housings since it is no longer possible to rely on the flexibility of the connection leads in order to compensate for
15 differences in expansion. Moreover, the trend of increasing the number of housings imposes increasingly greater size and heat removal requirements on the support.

In order to make it possible to remove heat, it has been proposed, for example in the document FR-A-1,481,645, to
20 produce the component support in the form of a hollow plate

equipped, on the inside, with a packing of fins and in which a coolant fluid circulates.

Aluminium supports are an excellent choice for adapting the coefficient of expansion to that of the housing, but when the
5 number of components used becomes too large, price and size limits are quickly encountered, in connection particularly with their fragility.

Supports formed by a board of pack-rolled metal materials are also known (for example, as the document "ELECTRONICS
10 INTERNATIONAL" vol. 54, no. 12, June 1981, page 46 describes). These boards consist, for example, of a layer of slightly dilatable metal, of the type sold under the brand name "INVAR", surrounded by two layers of copper. If necessary, radiators with heat dissipation fins may be attached to one of
15 these copper layers. This solution eliminates the size problems whilst at the same time permitting a precise adaption of the coefficient of expansion and a good heat conductivity, but it presents a drawback, however, for the materials used. In fact, the thickness of the support necessary to obtain the
20 desired rigidity involves a fairly high weight per unit of surface, and this weight is further increased when it is necessary to attach a cooling radiator, as referred to in the document FR-A-2,511,193.

On the other hand, the densification of the materials used leads to as great a reduction as possible of the size of the radiators, often leading to the adaptation of forced convection cooling which involves the assembly of complex
5 exchanger devices.

In order to respond to these problems, the present invention proposes a support structure which is perfectly suited to cooling by means of forced convection whilst at the same time combining the desired conditions of dilatibility, rigidity,
10 lightness and simplicity.

According to the invention there is provided a light-weight support intended to receive electronic components in a leadless housing and formed from pack-rolled metal materials to adjust the coefficient of thermal expansion of the support
15 to that of the housings, wherein the support is composed of a corrugated metal sheet fixed between two smooth sheets of which at least one receives the electronic components, and in that the two smooth sheets and the corrugated sheet are of pack-rolled metal materials.

20 The invention will be better understood with the aid of the following description referring to an embodiment which is given by way of example and by referring to the appended drawings which represent:

Figure 1. a diagrammatic perspective view of an electronic board comprising a support according to the invention; and

5 Figure 2. a transverse sectional view on a larger scale of the support of the electronic board.

Referring first of all to Figure 1, the electronic board consists of a support designated overall by the reference 1 and of electronic components 2.

10 The support 1 is formed from two smooth metal sheets 10 and 11 which surround a corrugated metal sheet 12 forming the core of the support 1. These three sheets (10-11-12) are assembled together by brazing or welding.

15 The corrugated sheet 12 therefore forms, between the two smooth sheets, channels 13 for the circulation of a cooling fluid throughout the electronic board.

The electronic components 2 are formed by small aluminium housings 20 each containing a dice or chip 21, these housings being directly connected to one or to both faces (10-11) by means of connection points 4 of a very thin multilayer
20 insulating film 3.

The two smooth sheets (10-11) and the corrugated sheet 12 are each in pack-rolled metal materials, for example two layers of copper $C_1 - C_2$ surrounding a layer of "INVAR" C_3 . The ratios between the thicknesses of this pack-rolled assembly are
5 chosen so that the resulting coefficient of expansion is in the neighbourhood of that of the aluminium housings 20 of the electric components 2. The thickness of the sheets (10-11-12) of the support 1 is generally chosen between 100 and 300 microns and is not necessarily the same for the three sheets.
10 The gap between the two sheets (10-11) of the support 1 may be chosen around 2 mm.

This support structure, which is extremely simple to produce, ensures a very good heat removal by virtue of the good conductivity of the copper layers and the possibility of
15 cooling by circulation of fluid in the corrugations. Moreover, with a light weight, it makes it possible to obtain good rigidity even for large sizes and also to attach the components on both faces of the support.

"INVAR" is a Trade Mark of Imphy S.A. and is an Ni alloy with
20 a very low expansion coefficient.

CLAIMS

1. Light-weight support intended to receive electronic components in a leadless housing and formed from pack-rolled metal materials to adjust the coefficient of thermal expansion of the support to that of the housings, wherein the support is composed of a corrugated metal sheet fixed between two smooth sheets of which at least one receives the electronic components, and in that the two smooth sheets and the corrugated sheet are of pack-rolled metal materials.
2. Light-wight support according to claim 1, wherein the ratios between the thicknesses of the pack-rolled metal materials of the sheets are set to obtain a resulting coefficient of expansion adjusted to that of the housings of the components.
3. Light-weight support according to Claim 1 and 2, wherein the pack-rolled metal materials of the sheets are formed from a layer of "INVAR" (Trade Mark) surrounded by two layers of copper.
4. A light-weight support substantially as hereinbefore described with reference to the drawings.

Fig 1

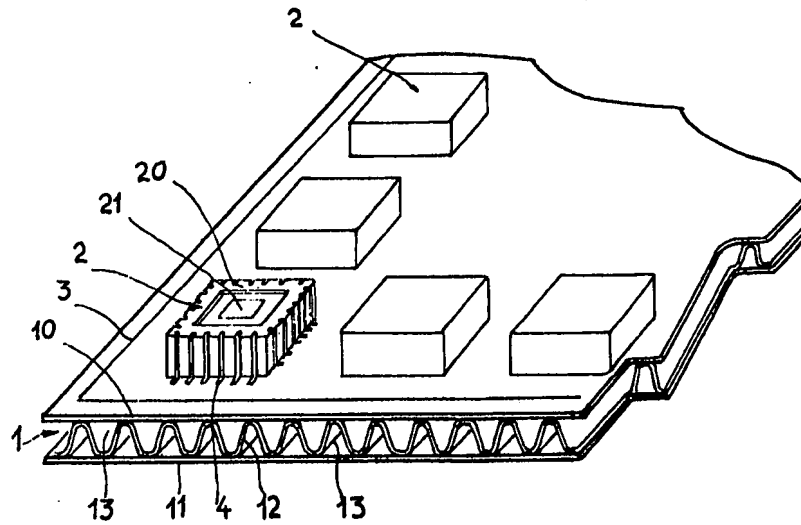


Fig 2

